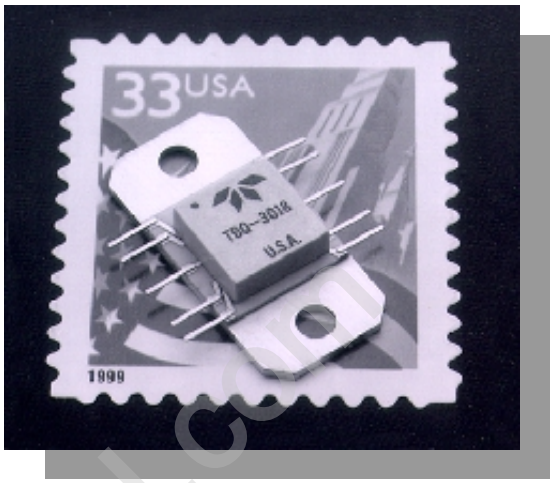
TBQ-3018

14.0 to 14.5 GHz GaAs MMIC

Power Amplifier for VSAT Applications



Features

- +30 dBm Output Power at 1 dB Gain Compression
- 35 dB typical Small Signal Gain
- 7 dB typical Noise Figure
- Thermally Efficient Copper-Tungsten Package

Product Description

The TBQ-3018 is a four stage PHEMT GaAs MMIC amplifier that is ideally suited to Ku-Band VSAT applications. The amplifier provides a minimum of 30 dB gain and delivers high efficiency at 1 watt output power from 14.0 to 14.5 GHz. The small package provides a simple, cost effective solution to customized designs. The base material is gold plated copper-tungsten to provide excellent thermal dissipation.

Electrical Specifications (T = + 25°C, V_d = 8V, V_g = -0.1V to -1.5V, I_d = 650mA)

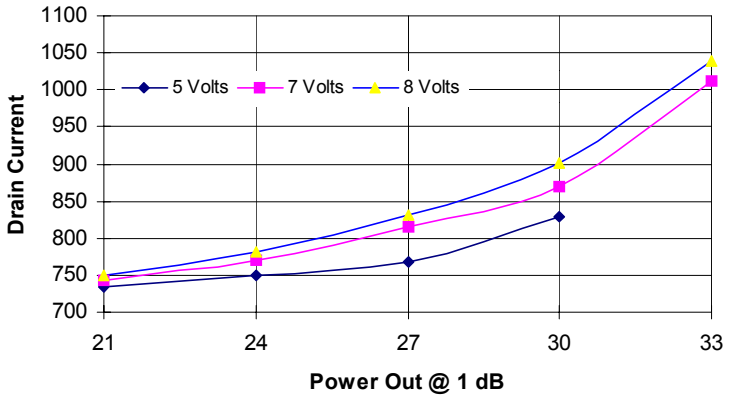
Parameter	Symbol	Min	Max	Typical	Units
Operating Frequency	F_{OP}	14	14.5	-	GHz
Gain	S_{21}	30	-	35	dB
Input /Output VSWR	VSWR	-	-	3:1	-
Output Power at 1 dB Gain Compression*	P_{-1dB}	30	-	31	dBm
Third Order Intercept	IP3	-	-	40	dBm
Noise Figure	NF	-	-	7	dB
Gain Variation Over Operating Frequency	ΔS_{21}	-	2	-	dB
Gain Variation Over Operating Frequency and Temperature	ΔS_{21}	-	-	-0.06	dB/ ° C

* I_d = 500mA, typical

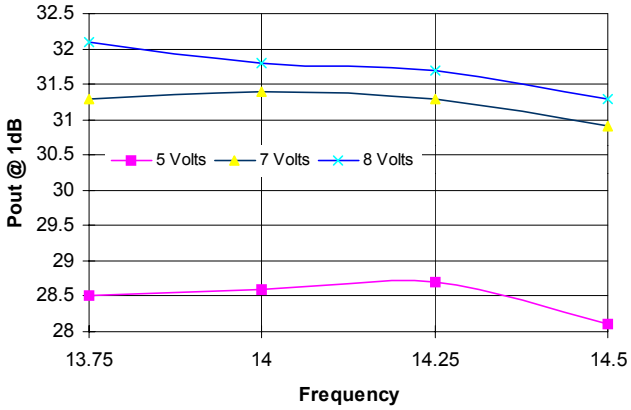
Maximum Ratings (T_A = + 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
DC Drain Supply Voltage	V_{DD}	9v	Vdc
DC Gate Supply Voltage	V_{GG}	-3V	Vdc
RF Input Power	P_{IN}	+1	mW
Junction Temperature	T_J	+150	°C
Storage Temperature	T_{STG}	-40 to +110	°C

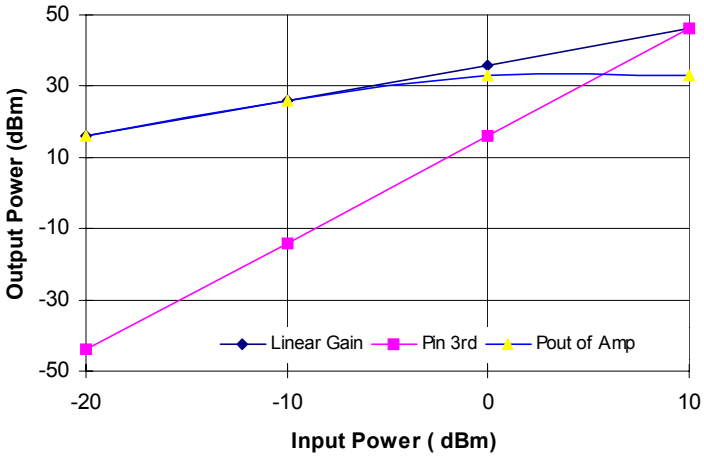
Drain Current vs Pout @ 1 dB vs Voltage



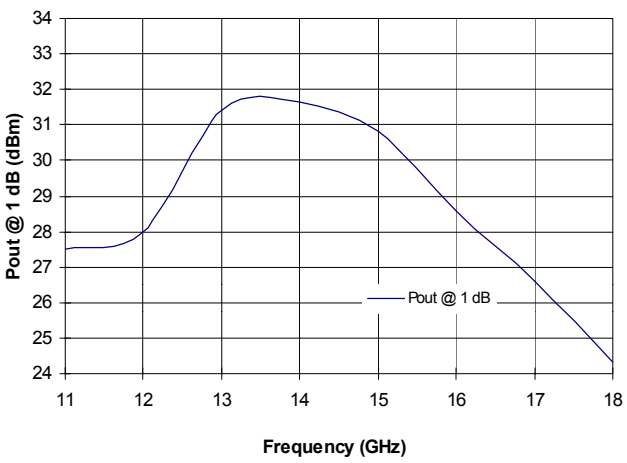
Pout@ 1 DB vs Frequency vs Drain Voltage



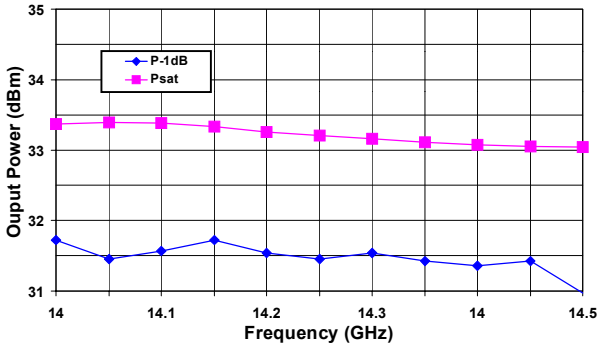
3rd Order Intercept Point (F = 14 GHz)



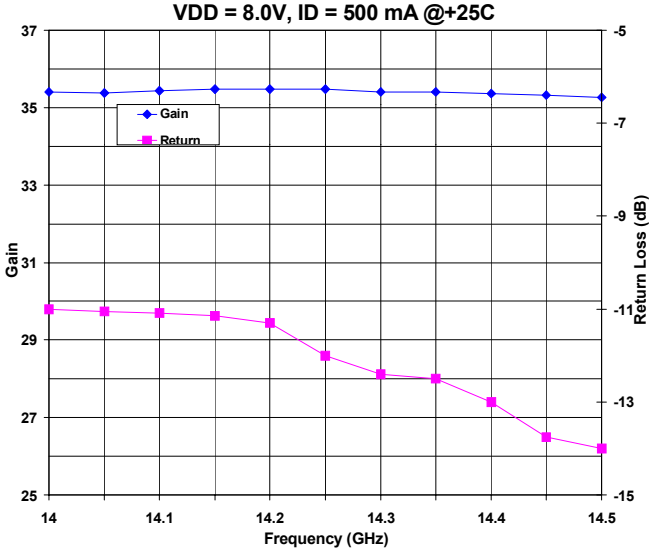
Pout @ 1 dB

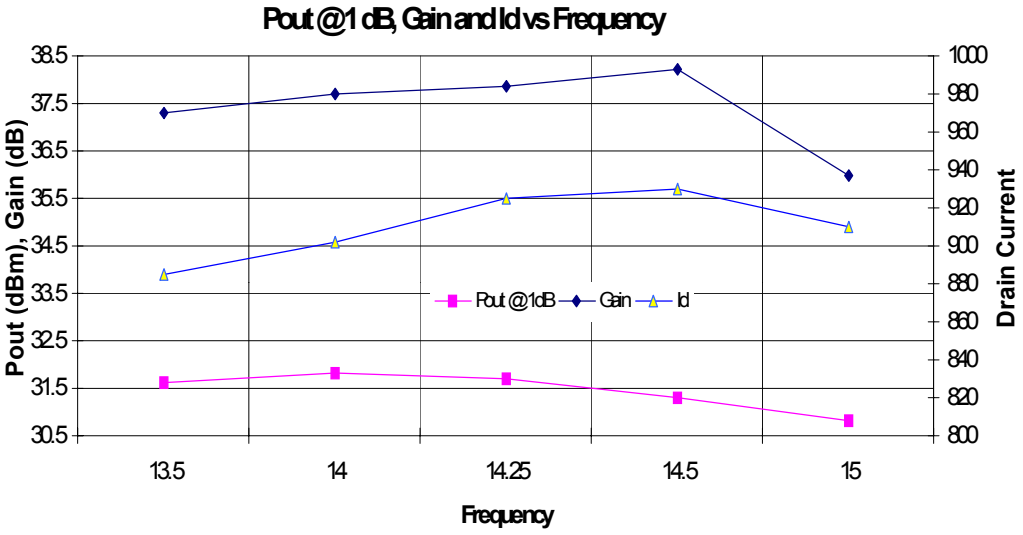


Typical Output Power
VDD=8.0V, ID=650 mA @+25C



Typical SSG and Input Return Loss
VDD = 8.0V, ID = 500 mA @+25C





Application Information

Power Amplifier Biasing Procedure

CAUTION: LOSS OF GATE VOLTAGE (VG) WHILE DRAIN VOLTAGE (VD) IS PRESENT MAY DAMAGE THE AMPLIFIER. THIS AMPLIFIER IS AN ESD SENSITIVE DEVICE.

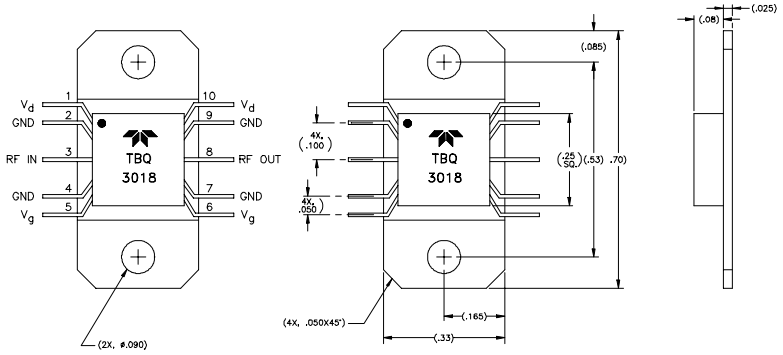
The following Procedure must be followed for the amplifier to operate properly:

1. Slowly apply Gate Voltage (typical Vpinch-off= -1.5V) to terminal VG.
2. Slowly apply Drain Voltage at VD (<+5 volts) and monitor drain current Ids. Adjust negative voltage VG to set the drain current (Ids) to approximately 600 mA. Adjust the drain voltage VD to nominal +8 volts (adjust Gate Voltage VG, if needed, to maintain the drain current at Ids.
3. After the bias condition is established, RF input signal may now be applied at the appropriate frequency band.
4. Follow Turn-off sequence: First, RF input power=off, next, VD=off, then, VG=off.

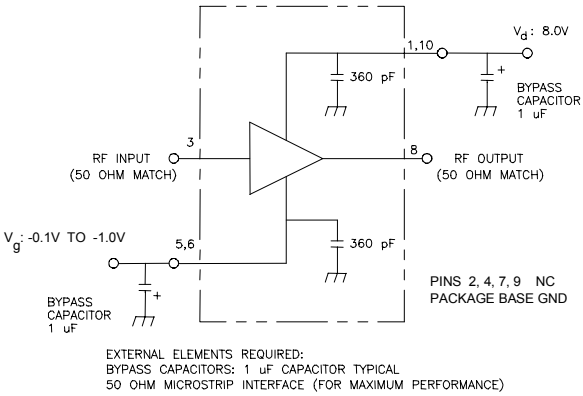
Device Handling Procedures

1. **Cleanliness:** Observe proper handling procedures to ensure clean devices and PCBs. Devices should remain in their original packaging until component placement to ensure no contamination or damage to RF, DC & ground contact areas.
2. **Device Cleaning:** Standard board cleaning techniques should not present device problems provided that the boards are properly dried to remove solvents or water residues.
3. **ESD precautions to protect against ESD damage:**
   - A properly grounded static-dissipative surface on which to place devices.
   - Static-dissipative floor or mat.
   - A properly grounded conductive wrist strap for each person to wear while handling devices.
4. **General Handling:** Handle the device along the edges with a sharp pair of bent tweezers. Do not apply excessive pressure to the top of the lid.
5. Device Storage: Devices should be stored in a dry nitrogen environment.

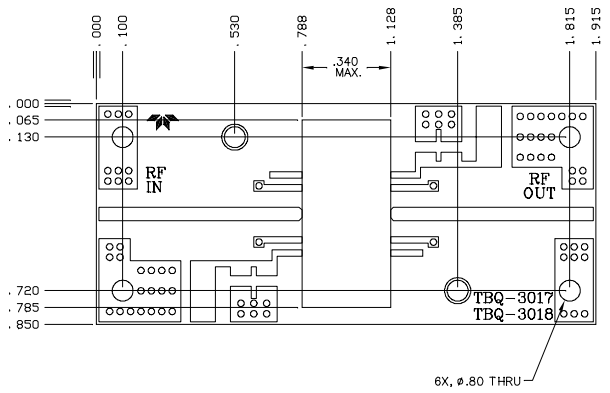
Package Outline



Typical Biasing Configuration



Evaluation Board



Notes

1. Dual bias supply required.
2. DC supply sequencing or protection circuitry not included. See Amplifier Biasing Procedure
3. A 360 pF DC supply line decoupling capacitor is included on both V_d and V_g lines. (See typical biasing configuration shown above).
4. The last fixture or circuit should incorporate additional bypass capacity (25ufd) on the drain and gate bias terminals to prevent oscillations caused by feedback signals.
5. Supply (drain and gate) wire/leads should be as short as possible.
6. Close placement of external components to the power amplifier is essential for stability purposes.
7. TET recommends the unit be soldered to DC and RF ground for best results.
8. Pin numbers indicated on outline drawing are for user information only. Units are not labeled with pin numbers.
9. MASK drawing for circuit board available on the Teledyne Wireless website at www.teledynewireless.com.